JC10 Rec'd PCT/PTO 16 AUG 2001

FORM-PTO-1390 (Rev. 12-29-99) U.S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: 033054-008

U S APPLICATION NO. (If known, see 37 C F R 1 5): Unassigned 09/913591

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/RU00/00035	4 February 2000 (04-02-00)	17 February 1999 (17-02-99)

TITLE OF INVENTION: SPOT-TYPE HIGH-INTENSITY X-RAY SOURCE (As amended)

APPLICANT(S) FOR DO/EO/US: LAZAREV, Pavel Ivanovich; and KOMARDIN, Oleg Valentinovich

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and the PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
   a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☒ has been transmitted by the International Bureau.
   c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US)
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
   a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
   b. ☐ have been transmitted by the International Bureau.
   c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
   d. ☒ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98 with partial or complete English translations of 5 foreign language documents.
12. ☒ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A FIRST preliminary amendment.
    ☐ A SECOND or SUBSEQUENT preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items or information:

Submission of Formal Drawings with 3 Sheets of formal drawings; PCT Forms IPEA/401, RO/101, ISA/210 (with English second sheet), IPEA/409 (with partial English translation) and a Verified Statement Claiming Small Entity Status.

EJC Rec'd PCT/PTO 16 AUG 2001

U.S. APPLICATION NO. (If known, see 37 C.F.R. 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
Unassigned 09/913591	PCT/RU00/00035	033054-008

17. ☒ The following fees are submitted:	CALCULATIONS	PTO USE ONLY
Basic National Fee (37 CFR 1.492(a)(1)-(5)):		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO $1,000.00 (960)		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO $860.00 (970)		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO $710.00 (958)		
International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) $690.00 (956)		
International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) $100.00 (962)		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 1000.00	
Surcharge of **$130.00 (154)** for furnishing the oath or declaration later than 20 ☐ 30 ☐ months from the earliest claimed priority date (37 CFR 1.492(e)).	$	

Claims	Number Filed	Number Extra	Rate		
Total Claims	-20 =		X$18.00 (966)	$	
Independent Claims	-3 =		X$80.00 (964)	$	
Multiple dependent claim(s) (if applicable)			+$270.00 (968)	$	
TOTAL OF ABOVE CALCULATIONS =				$ 1000.00	
Reduction for 1/2 for filing by small entity, if applicable (see below).				$ 500.00	-
SUBTOTAL =				$ 500.00	
Processing fee of **$130.00 (156)** for furnishing the English translation later than 20 ☐ 30 ☐ months from the earliest claimed priority date (37 CFR 1.492(f)). +				$	
TOTAL NATIONAL FEE =				$ 500.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00 (581)** per property +				$ 40.00	
TOTAL FEES ENCLOSED =				$ 540.00	
				Amount to be: refunded	$
				charged	$

a. ☒ Small entity status is hereby claimed.

b. ☒ A check in the amount of $ 540.00 to cover the above fees is enclosed.

c. ☐ Please charge my Deposit Account No. 02-4800 in the amount of $_____ to cover the above fees. A duplicate copy of this sheet is enclosed.

d. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 02-4800. A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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Douglas H. Pearson
SIGNATURE R.N. 47,851

for Ronald L. Grudziecki
NAME

24,970
REGISTRATION NUMBER

Date: August 16, 2001

09/913591

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Patent
Attorney's Docket No. 033054-008

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	)	
	)	
Pavel Ivanovich LAZAREV et al.	)	Group Art Unit: Unassigned
	)	
Application No.: Unassigned	)	Examiner: Unassigned
	)	
Filed: August 16, 2001	)	
	)	
For: SPOT-TYPE HIGH-INTENSITY X-RAY SOURCE (As amended herein)	)	

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination on the merits, please amend the above-identified application as follows:

IN THE TITLE:

Please change the title from "HIGH-INTENSITY POINT SOURCE OF X-RAY RADIATION" to --SPOT-TYPE HIGH-INTENSITY X-RAY SOURCE--.

IN THE CLAIMS:

Please replace claims 1, 3 and 5-7 as follows:

1. (Amended) An X-ray radiation source comprising an evacuated chamber with a window for X-ray radiation output, in which an electron emitter and a transparent

anode are positioned to generate X-ray radiation, at least one focusing electron lens, and a device shaping the X-ray radiation beam placed outside the chamber but attached to it, wherein the anode is positioned before a focus of said electron lens along the electron beam path and wherein the device shaping the X-ray radiation beam is a diaphragm, the center of said diaphragm being placed at the focus of said electron lens.

3. (Amended) An X-ray radiation source of Claim 1 wherein the anode is tightly vacuum-attached to the window for X-ray radiation output and positioned inside that window.

5. (Amended) An X-ray radiation source of Claim 1, wherein the electron lens has a point focus.

6. (Amended) An X-ray radiation source of Claim 1, wherein the electron lens has a dash-like focus.

7. (Amended) An X-ray radiation source of Claim 1, wherein the electron source used is a pulse source.

REMARKS

Claim 1 has been amended to conform to conventional U.S. practice, and claims 3-7 have been amended to remove multiple dependencies. Favorable consideration on the merits is respectfully solicited.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

By: _____
Douglas H. Pearson
Registration No. 47,851

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

Date: August 16, 2001

Attachment to Preliminary Amendment dated August 16, 2001

Marked-up Claims 1, 3 and 5-7

1. (Amended) An X-ray radiation source comprising an evacuated chamber with a window for X-ray radiation output, in which an electron emitter and a transparent anode are positioned to generate X-ray radiation, at least one focusing electron lens, and a device shaping the X-ray radiation beam placed outside the chamber but attached to it, wherein the anode is positioned before [the] a focus of said electron lens [focus] along the electron beam path [while] and wherein the device shaping the X-ray radiation beam is a diaphragm, the center of [the] said diaphragm being placed at the focus of [the] said electron lens.

3. (Amended) An X-ray radiation source of [Claims 1 and 2] Claim 1 wherein the anode is tightly vacuum-attached to the window for X-ray radiation output and positioned inside that window.

5. (Amended) An X-ray radiation source of [any of Claims 1 through 4] Claim 1, wherein the electron lens has a point focus.

6. (Amended) An X-ray radiation source of [any of Claims 1 through 4] Claim 1, wherein the electron lens has a dash-like focus.

Attachment to Preliminary Amendment dated August 16, 2001

Marked-up Claims 1, 3 and 5-7

7. (Amended) An X-ray radiation source of [any of Claims 1 through 6] Claim 1, wherein the electron source used is a pulse source.

High-intensity point source of X-ray radiation

The proposed invention belongs to the class of X-ray sources allowing to obtain intensive X-ray radiation with small effective dimensions of the radiation emission region. The invention is intended to be used in X-ray microscopy, micro-defectoscopy, computer tomography, etc.

The X-ray radiation is known to be generated when an electron beam emitted by a cathode and accelerated by the electrode potential bombards an anode. When electrons decelerate in some material, X-ray radiation is generated. As investigation of X-ray radiation beam pattern emitted by an X-ray tube anode shows, the primary direction of the softer radiation component is perpendicular to the electron beam direction, while the direction of the harder component is close to that of the electrons falling onto the anode. As the applied voltage increases, the diagram of the X-ray radiation spatial distribution becomes more narrow-angled.

To either achieve high definition or to enlarge an image of the X-rayed object region (X-ray microscopy), radiation sources with small effective dimensions of the radiation emission regions, usually micro-focal X-ray tubes, are used. The target region out of which X-ray radiation is emitted when the target is bombarded by the electron beam is called the focus. The X-ray tubes in which the focus dimensions do not exceed several microns (or tens of microns) are called micro-focal. The focal spot dimensions are determined by the electron beam focusing extent, the target material, and the X-ray source design. The focal spot dimensions and the source radiation intensity that can be achieved are primarily dependent on the target material thermal resistance. Since a large amount of heat is released within a finite space when the electron beam decelerates in the target material, the target may be destroyed; this is the so-called thermal limit of the focal spot dimensions for the given specific load. On the other hand, the focal spot dimensions can not be made infinitely small due to electron scattering within the target material because this scattering increases the dimensions of the X-ray radiation emission region; this is the so-called electron limit. Increasing the tube radiation intensity, simultaneously making the focal spot dimensions smaller, is almost always a difficult task because the small focal spot dimensions do not allow to increase the electron beam intensity due to the target material destruction caused by release of great amount of heat. In certain X-ray tubes with 1-micron focal spots, the released power is about several hundredths of a Watt; the power is 0.6 Wt for 5-micron dimensions of the focal point. One more problem of manufacturing micro-focal X-ray tubes is to achieve the short focal distance, i.e. the distance between the X-ray tube focus and the X-ray radiation output window. To implement this, the tubes with transparent anodes are used. In these tubes, X-ray radiation is emitted from the target side opposite to the side of the electron beam incidence.

To make the anode focal spot small, the focusing accessories such as electrostatic, magnetic, and electromagnetic lenses are used; to decrease the thermal load on the anode focal spot with small dimensions, anode scanning by the electron beam is used as well as devices for anode rotation.

A micro-focal X-ray tube is known in prior art in which electrons emitted by the cathode are focused by the electron lenses into a point on the anode. The three-layer anode contains the target made of foil to generate X-ray radiation, the layer for electron deceleration, and the supporting substrate due to which the anode also serves as the X-ray-tube window. In this tube, the anode is transparent. To avoid anode damage at the point of electron beam incidence, the anode is connected to the engine providing anode rotation, so electrons fall onto different anode regions. (See Application PCT No. WO 96/29723, H01J 35/08, 35/24, publ. in 1996).

A high-power X-ray tube is described in the German patent No. 2441986, H01J 35/04, publ. in 1975. The tube is an evacuated chamber with the radiation output window, inside which an incandescent cathode is positioned as well as a transparent anode in the form of a cone, with the cone vertex directed towards the cathode. Electronic-optical accessories control the electron beam, thus providing uniform anode load.

In the German application No. 3543591 A1, H01J 35/22, publ. in 1986, a pulse micro-focal X-ray tube is described comprising the cathode, the electron lens to focus the electron beam, and the anode either transparent or massive and cooled, with a target to generate X-ray radiation. In this case, X-ray radiation comes out through a beryllium window at 90° angle with respect to the direction of the electron incidence.

The X-ray radiation source is also known which is the evacuated chamber with the window for X-ray radiation output, inside which the cathode and the anode are positioned. The source also contains the device directing the narrow electron beam to fall onto the anode and the deflecting device scanning the anode. The anode is transparent and has the following design: the target is a thin layer of a metal, for example, copper, deposited by vacuum spraying onto a thin substrate made of a metal with a relatively small atomic number, for example, aluminum. The plate made of a small-atomic-number material, for example, plastic, serves as a holder for the substrate; a multi-aperture cellular supporting structure is also present in the construction. Such design provides high transmission of X-ray radiation generated by the target. The chamber is placed into a collimating device allowing to properly shape the X-ray radiation beam (a source of this type is described in the USA patent No. 4057745, Cl. H01J 35/08, publ. in 1977). That technical solution is closest to the one proposed herein.

The invention purpose is to create the X-ray radiation source providing decrease of the radiation-emission region effective dimensions for sufficiently high radiation intensity and short focal distance.

The conventional methods in which the anode is scanned by the electron beam or rotated are not used to decrease the anode load. The electron beam is proposed to be focused behind the anode, and an X-ray-beam diaphragm is proposed to be positioned at the focus of the electron lens. As the defocused electron beam falls onto the anode, the anode radiation load decreases, thus allowing to increase the acceptable electric power. Due to X-ray radiation beam pattern formed for such geometry and to positioning the diaphragm at the electron lens focus, the obtained radiation is similar in its characteristics to that of a micro-focal source positioned at the location of the diaphragm and having the corresponding focal-spot dimensions.

The invention essence is that, in the well-known technical solution, which is an X-ray radiation source comprising an evacuated chamber with a window for X-ray radiation output and with an electron emitter and a transparent anode positioned in the window to generate X-ray radiation, at least one focusing electron lens, and a device shaping the X-ray radiation beam placed outside the chamber but attached to it, the anode is positioned before the electron lens focus along the electron beam path while the device shaping the X-ray radiation beam is a diaphragm, the center of which is placed at the focus of the electron lens.

To reduce the X-ray radiation losses, the anode can also serve as the X-ray-tube window. In this case, to increase the structural strength, the anode is implemented as a target made of metal foil deposited onto a substrate made of a small-atomic-number material with high heat conductivity. The anode may also be tightly vacuum-attached to the window for X-ray radiation output and positioned inside that window. The electron lens may have either a point or a dash-like focus, depending on problems to be solved. When the anode is the X-ray-tube window, the anode can be equipped with a cooling facility. The electron source used may be a pulse source.

The invention essence is explained by the following drawings:

•In Fig.1, the beam pattern of radiation of the X-ray tube with the transparent anode is shown for different anode-cathode voltage values ($U_3 > U_2 > U_1$).

•In Fig.2, the direction of the electron beam incidence and the X-ray-radiation beam pattern for the proposed source are shown.

•In Fig.3, the layout overview for the proposed X-ray-radiation source is schematically presented.

Figure 2 illustrates that the spatial distribution of radiation emitted by the proposed source is identical to that of radiation of a micro-focal source positioned at the location of the diaphragm, with the anode ray load reduced (the beam is defocused on the target). This figure shows the electron beam 1 that falls onto the target 2 that generates X-ray radiation 3 converging towards the diaphragm 4, the aperture of which is placed at the electron lens focus (not shown in this drawing). Item 6 indicates spatial distribution of X-ray radiation at the output of the proposed source.

Consider operation of the device shown in Fig.3. Electrons emitted by the cathode 7 (e.g. a thermocathode; however, this is not essential) are shaped by the focusing cap into a beam and are focused by the electron lenses 9 and 10 on the anode 11, which is the target 12 made of metal foil deposited onto the substrate 13 made of small-atomic-number material (the target can be deposited onto the substrate by vacuum spraying). The substrate provides the structural strength and heat removal and can be conveniently fixed to the source chamber so as the anode can also serve as the window for X-ray radiation output. However, the anode made of foil can be used without the substrate. In this case, the chamber is supplied with a beryllium window for X-ray radiation output (not presented in the drawing). The anode and the cathode are positioned within the evacuated chamber 14. The diaphragm 15 shaping the X-ray radiation beam is positioned outside the chamber and behind the anode. The diaphragm can be attached to the

source chamber 14. The center 16 of the diaphragm 15 must be placed at the focus of the electron lens 10. The electron lens 10 can have either a point or a dash-like focus, depending on the problems to be solved using the equipment in which the proposed X-ray radiation source is implemented. When the anode is the source output window, it may be equipped with the cooling facility 17.

Claims

1. An X-ray radiation source comprising an evacuated chamber with a window for X-ray radiation output, in which an electron emitter and a transparent anode are positioned to generate X-ray radiation, at least one focusing electron lens, and a device shaping the X-ray radiation beam placed outside the chamber but attached to it, wherein the anode is positioned before the electron lens focus along the electron beam path while the device shaping the X-ray radiation beam is a diaphragm, the center of the said diaphragm being placed at the focus of the said electron lens.

2. An X-ray radiation source of Claim 1, wherein the anode is a target made of metal foil deposited onto a substrate made of a small-atomic-number material.

3. An X-ray radiation source of Claims 1 and 2, wherein the anode is tightly vacuum-attached to the window for X-ray radiation output and positioned inside that window.

4. An X-ray radiation source of Claim 3, wherein the anode is equipped with a cooling facility.

5. An X-ray radiation source of any of Claims 1 through 4, wherein the electron lens has a point focus.

6. An X-ray radiation source of any of Claims 1 through 4, wherein the electron lens has a dash-like focus.

7. An X-ray radiation source of any of Claims 1 through 6, wherein the electron source used is a pulse source.

Abstract

The invention belongs to the class of the X-ray radiation sources with small effective dimensions of the radiation emission regions and is designed to be used in X-ray microscopes, micro-defectoscopes, and X-ray tomographs. The device comprises the electron emitter 7, the focusing lenses 9,10, and the transparent anode 11, which can be positioned inside the radiation-source window and equipped with the cooling facility 17. The electron beam is focused either into a point or a dash behind the anode along the electron beam path. The center 16 of the diaphragm 15 of the X-ray beam is placed at the focus of the electron lens 10. Number of Claims: 7.

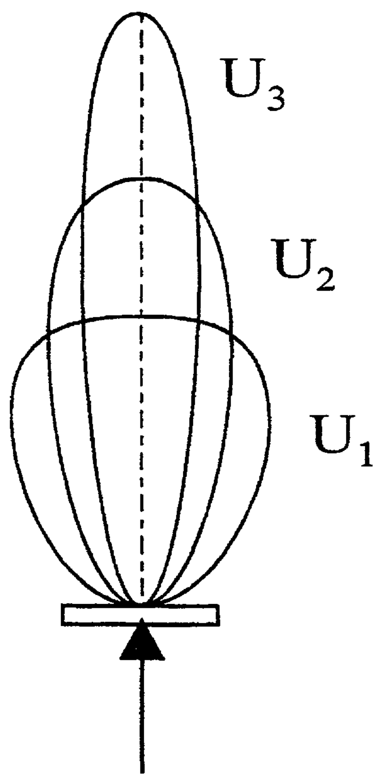

Fig. 1

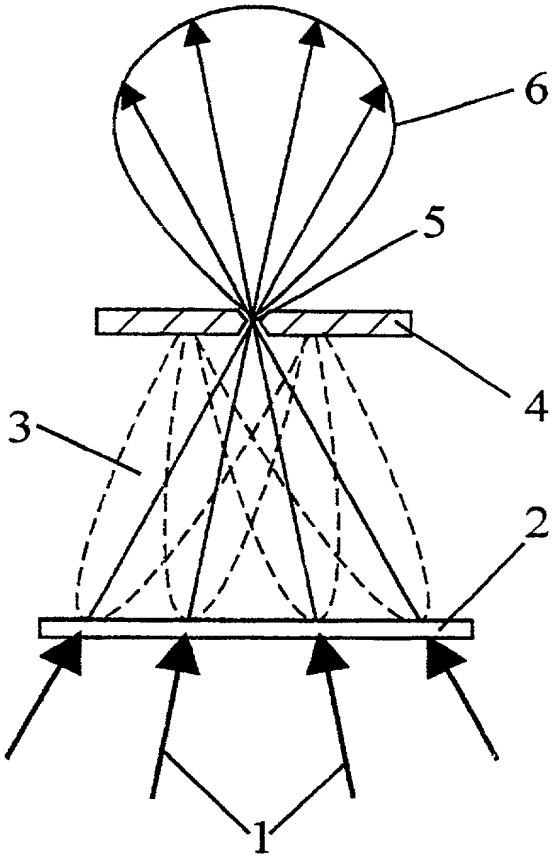

Fig. 2

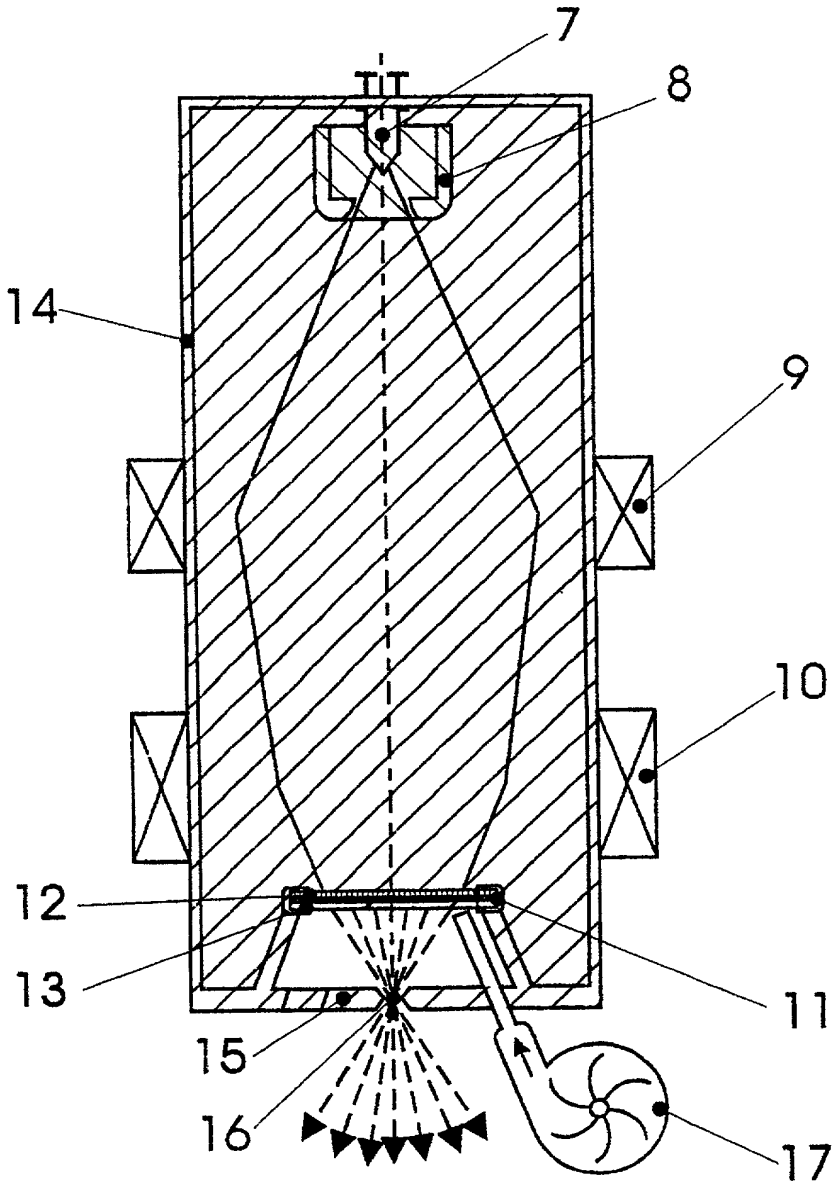

Fig. 3

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (Includes Reference to Provisional and PCT International Applications)	ATTORNEY'S DOCKET NUMBER

As a below named inventor, I hereby declare that:
My residence, post office address and citizenship are as stated below next to my name;
I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

SPOT-TYPE HIGH-INTENSITY X-RAY SOURCE

the specification of which (check only one item below):

☒ is attached hereto.

☐ was filed as United States application
Number _____
on _____
and was amended
on _____ (if applicable).

☒ was filed as PCT international application
Number PCT/RU00/00035
on 4 February 2000
and was amended under PCT Article 19
on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose to the Office all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 (a)-(e) of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed:

PRIOR FOREIGN/PCT APPLICATION(S) AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. §119:

COUNTRY (If PCT, indicate "PCT")	APPLICATION NUMBER	DATE OF FILING (day, month, year)	PRIORITY CLAIMED UNDER 35 U.S.C. §119
Russia	99103217	17.02.1999	X Yes __ No
PCT	PCT/RU00/00035	04.02.2000	__ Yes __ No
			__ Yes __ No
			__ Yes __ No
			__ Yes __ No

I hereby claim the benefit under Title 35, United States Code § 119(e) of any United States provisional application(s) listed below.

_____ _____
(Application Number) (Filing Date)

_____ _____
(Application Number) (Filing Date)

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (CONTINUED) (Includes Reference to Provisional and PCT International Applications)	ATTORNEY'S DOCKET NO.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States applications(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/these prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose to the Office all information known to me to be material to the patentability as defined in Title 37, Code of Federal Regulations §1.56, which became available between the filing date of the prior application(s) and the national or PCT international filing date of this application:

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 U.S.C. 120:

U.S. APPLICATIONS		STATUS (check one)		
U.S. APPLICATION NUMBER	U.S. FILING DATE	PATENTED	PENDING	ABANDONED

PCT APPLICATIONS DESIGNATING THE U.S.

PCT APPLICATION NO.	PCT FILING DATE	U.S. APPLICATION NUMBERS ASSIGNED (if any)			

I hereby appoint the following attorneys and agent(s) to prosecute said application and to transact all business in the Patent and Trademark Office connected therewith and to file, prosecute and to transact all business in connection with international applications directed to said invention:

William L. Mathis	17,337	George A. Hovanec, Jr.	28,223	Peter K. Skiff	31,917
Peter H. Smolka	15,913	James A. LaBarre	28,632	Richard J. McGrath	29,195
Robert S. Swecker	19,885	E. Joseph Gess	28,510	Matthew L. Schneider	32,814
Platon N. Mandros	22,124	R. Danny Huntington	27,903	Michael G. Savage	32,596
Benton S. Duffett, Jr.	22,030	Eric H. Weisblatt	30,505	Gerald F. Swiss	30,113
Norman H. Stepno	22,716	James W. Peterson	26,057	Michael J. Ure	33,089
Ronald L. Grudziecki	24,970	Teresa Stanek Rea	30,427	Charles F. Wieland III	33,096
Frederick G. Michaud, Jr.	26,003	Robert E. Krebs	25,885	Bruce T. Wieder	33,815
Alan E. Kopecki	25,813	William C. Rowland	30,888	Todd R. Walters	34,040
Regis E. Slutter	26,999	T. Gene Dillahunty	25,423	Ronni S. Jillions	31,979
Samuel C. Miller, III	27,360	Patrick C. Keane	32,858	Harold R. Brown III	36,341
Ralph L. Freeland, Jr.	16,110	Bruce J. Boggs, Jr.	32,344	Allen R. Baum	36,086
Robert G. Mukai	28,531	William H. Benz	25,952	Steven M. du Bois	35,023

and: _____

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P.O. Box 1404
Alexandria, Virginia 22313-1404

Address all telephone calls to: Ronald L. Grudziecki at (703) 836-6620

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY (CONTINUED) (Includes Reference to Provisional and PCT International Applications)	ATTORNEY'S DOCKET NO

FULL NAME OF SOLE OR FIRST INVENTOR LAZAREV Pavel Ivanovich	SIGNATURE Lazarev Pavel Ivan.	DATE 20.07.2001
RESIDENCE Moscow, Russia RUX		CITIZENSHIP Russian
POST OFFICE ADDRESS 119633, Moscow, ul. Novoorlovskaya, 12, kv. 120		
FULL NAME OF SECOND JOINT INVENTOR, IF ANY KOMARDIN Oleg Valentinovich	SIGNATURE Komardin Oleg Valentinovich	DATE 20.07.01
RESIDENCE Moscow, Russia RUX		CITIZENSHIP Russian
POST OFFICE ADDRESS 121467, Moscow, ul. Elninskaya, 3, kv. 71		
FULL NAME OF THIRD JOINT INVENTOR, IF ANY	SIGNATURE	DATE
RESIDENCE		CITIZENSHIP
POST OFFICE ADDRESS		
FULL NAME OF FOURTH JOINT INVENTOR, IF ANY	SIGNATURE	DATE
RESIDENCE		CITIZENSHIP
POST OFFICE ADDRESS		
FULL NAME OF FIFTH JOINT INVENTOR, IF ANY	SIGNATURE	DATE
RESIDENCE		CITIZENSHIP
POST OFFICE ADDRESS		
FULL NAME OF SIXTH JOINT INVENTOR, IF ANY	SIGNATURE	DATE
RESIDENCE		CITIZENSHIP
POST OFFICE ADDRESS		
FULL NAME OF SEVENTH JOINT INVENTOR, IF ANY	SIGNATURE	DATE
RESIDENCE		CITIZENSHIP
POST OFFICE ADDRESS		
FULL NAME OF EIGHTH JOINT INVENTOR, IF ANY	SIGNATURE	DATE
RESIDENCE		CITIZENSHIP
POST OFFICE ADDRESS		
FULL NAME OF NINTH JOINT INVENTOR, IF ANY	SIGNATURE	DATE
RESIDENCE		CITIZENSHIP
POST OFFICE ADDRESS		

Applicant or Patentee:
Serial or Patent No:
Filed or Issued:
For:

Case No.:

VERIFIED STATEMENT (DECLARATION) CLAIMING SMALL ENTITY STATUS
(37 CFR 1.9(f) and 1.27(c)) - SMALL BUSINESS CONCERN

I hereby declare that I am

☐ the owner of the small business concern identified below

☒ an official of the small business concern empowered to act on behalf of the concern identified below:

NAME OF CONCERN QUANTA VISION, Inc.
ADDRESS OF CONCERN 1670 South Amphlett Blvd., Suite 214 San Mateo, CA 94402, USA

I hereby declare that the above identified small business concern qualifies as a small business concern as defined in 13 CFR 121.3-18, and reproduced in 37 CFR 1.9(d) for purposes of paying reduced fees under Section 41(a) and (b) of Title 35, United States Code, in that the number of employees of the concern, including those of its affiliates, does not exceed 500 persons. For purposes of this statement, (1) the number of employees of the business concern is the average over the previous fiscal year of the concern of the persons employed on a full-time, part-time or temporary basis during each of the pay periods of the fiscal year, and (2) concerns are affiliates of each other when either, directly or indirectly, one concern controls or has the power to control the other, or a third party or parties controls or has the power to control both.

I hereby declare that rights under contract or law have been conveyed to and remain with the small business concern identified above with regard to the invention, entitled by inventor(s) SPOT-TYPE HIGH-INTENSITY X-RAY SOURCE described in

☒ the specification filed herewith.

☐ application serial no. _____, filed _____.

☐ patent no. _____, issued _____.

If the rights held by the above identified small business concern are not exclusive, each individual, concern or organization having rights to the invention is listed below* and no rights to the invention are held by any person, other than the inventor, who would not qualify as an independent inventor under 37 CFR 1.9(c) if that person made the invention, or by any concern which would not qualify as a small business concern under 37 CFR 1.9(d), or a nonprofit organization under 37 CFR 1.9(e). *NOTE: Separate verified statements are required from each named person, concern or organization having rights to the invention averring to their status as small entities. (37 CFR 1.27)

NAME
ADDRESS

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

NAME
ADDRESS

☐ INDIVIDUAL ☐ SMALL BUSINESS CONCERN ☐ NONPROFIT ORGANIZATION

I acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement to small entity status prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application, any patent issuing thereon, or any patent to which this verified statement is directed.

SIGNATURE Pavel Ivan Lazarev DATE 16 July 2001
NAME OF PERSON SIGNING Pavel Lazarev
TITLE OF PERSON OTHER THAN OWNER Chairman of the BD
ADDRESS OF PERSON SIGNING Russia, 119633, Moscow, ul. Novoorlovskaya 12, kv. 120